

REMARKS

Claims 17-21, 25, 26 and 37-43 are pending. Claims 39, 42 and 43 are amended.

Claims 39-43 were rejected under 35 USC §112, second paragraph, as being indefinite. It is respectfully submitted that the amendments overcome the informality noted by the Examiner.

Claims 39 and 41 were rejected under 35 USC § 102(b) as being anticipated by Behun. Favorable reconsideration of this rejection is requested in view of the amendments made herein.

As described at col. 3, line 65 through col. 4, line 2 in Behun, the high melting point solder ball 18 is connected to the interconnection of the integrated circuit chip such as the bonding pad 12 on the first substrate 10 by a low melting point solder 16 whether the interconnection is terminated at non-melting metal bonding pad 12 or at the low melting point solder itself (or referred as to "at least one first solder portion" in claim 1) on the first substrate. The assembly is heated to reflow the low melting point solder 16, which then wets to the non-molten solder ball.

In contrast, in the claimed invention, none of the low melting point solder is used to connect the non-molten soldering metal bump 3A to the first electrode pad 2 on the first substrate 1 having repellency to molten metal as shown in Figs. 2A and 2B. Since the first soldering metal bump is (directly) formed by deposition technique using a mask having an opening with the same pattern as the first electrode pad, a bottom area of the first soldering metal bump can be almost as large as the surface area of the first electrode pad. Such a large contact area and inherent physical property of (vapor) deposition technique prevent disconnection failure of the interface between the first electrode pad and the first soldering metal bump. Another distinction in the

fabrication method is that in Behun, two heating processes are needed in order to complete the connector structure comprising an IC chip and the counter circuit board, firstly to melt the first solder portion 16 to connect to the solder ball 18 to the first substrate 10 (the IC chip) and then secondly to melt the third solder portion 13 to connect the solder ball 18 to the second substrate 11 (the counter circuit board).

Claims 40 and 43 were rejected under 35 USC §103(a) as being unpatentable over Behun further in combination with Hideshima. Favorable reconsideration of this rejection is earnestly solicited.

The Examiner states that it would have been obvious to use the Al electrode of Hideshima as the first electrode of Behun because it would provide the first electrode of Behun. However, as discussed in the sentences bridging col. 3 and col. 4 in Behun, “an LMP solder 16 is applied to bonding pad 12 (corresponding to the first electrode pad in the claimed invention). An HMP solder ball 18 is placed in contact with LMP solder 16, and the assembly is heated to reflow the LMP solder 16, which then wets to the non-molten HMP solder ball” (parenthetical added). This means unambiguously that both the bonding pad 12 and the non-molten HMP solder ball must have adhesive tendency (or be wettable) to molten solder 16. Therefore, the bonding pad of Behun can not be replaced by a metal such as Al having repellant tendency to molten metal.

Claim 42 was rejected under 35 USC §103(a) as being unpatentable over Behun and further in combination with Dudderar. Favorable reconsideration of this rejection is earnestly solicited.

The shape of the deposited solder body in Dudderar is trapezoidal in cross-section on an axis. However, before connection, the conical shape is transformed into a truncated sphere

referred to as "solder bump" as shown in Fig. 3 by melting. In Dudderar, the deposited solder body is connected to the electrode pad by melting without additional low melting solder. On the other hand, the solder ball of Behun is non-molten solder which needs additional low melting solder to be connected to the electrode pad. Both are incompatible to each other.

Accordingly, the combination of art fails to teach or suggest the features of claim 42.

For at least the foregoing reasons, the claimed invention distinguishes over the cited art and defines patentable subject matter. Favorable reconsideration is earnestly solicited.

Should the Examiner deem that any further action by applicants would be desirable to place the application in condition for allowance, the Examiner is encouraged to telephone applicants' undersigned attorney.

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 50-2866.

Respectfully submitted,

WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP



Stephen G. Adrian

Attorney for Applicants

Reg. No. 32,878

SGA/arf

Atty. Docket No. **950637B**

Suite 700

1250 Connecticut Avenue, N.W.

Washington, D.C. 20036

(202) 822-1100

* 38834 *

38834

PATENT TRADEMARK OFFICE